

## Dimensional Inadequacy of Rankings: Exploring Substantial and Meta-quality Dimensions for Higher Educational Institutions

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### Abstract

Evaluation of higher educational institutions is a topic of significant concern in the present information-based era. Various institutional rankings have been born to evaluate higher educational institutions. However, several shortcomings have been reported in their evaluation methodologies. Besides these, we perceive that most institutional rankings are centered mainly on teaching and research dimensions. In contrast, recent studies suggest that several other dimensions exist that are equally important to academic stakeholders. We, therefore, analyze popular rankings with respect to their adequacy of quality dimensions. We explore additional substantial as well as meta-quality dimensions for higher educational institutions using the grounded theory approach. These explored dimensions include transparency, accountability, academic flexibility, infrastructure, financial assistance, etc. Moreover, we find noticeable differences among the priorities of stakeholders regarding these dimensions, which suggest that the aspirations of different academic communities are divergent. Therefore, the rankings methodologies should be designed considering these divergent aspirations of the stakeholders.

### Keywords

Institutional quality; Meta-quality; Academic stakeholders; University rankings.

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## 1. Introduction

The worldwide expansion of access to higher education created a huge demand for consumer information regarding institutional quality (Dill & Soo, 2005). As a result, various institutional rankings have been developed. These rankings are followed worldwide while selecting institutions to pursue education or a career (Altbach, 2013). However, several shortcomings have been reported in their methodologies, such as statistical inaccuracies, inappropriate quality metrics, etc., (Harvey, 2008; Bowden, 2000). Apart from these, we argue in this paper that the dimensions considered for the institutional rankings are inadequate. Most of the existing institutional rankings, especially the global ones, are centered mainly on teaching and research, which alone do not satisfy the whole set of stakeholders' aspirations. Thus, the dimensions of quality covered by existing rankings are inadequate for evaluation and do not satisfy the aspirations of several academic stakeholders.

Due to the diversity in higher education, different institutions fulfill different roles (Boulton, 2011). Several national and local factors influence their objectives and performance. These include academic structure, cultural and societal needs, finance, governance, and administration (Marginson & Rhoades, 2002; Deem, 2001). Though national rankings are developed considering country-specific issues, they cannot address the whole set of stakeholders' aspirations.

Keeping this in mind, we critically analyze popular international and national university rankings concerning their coverage regarding quality dimensions. In the process, we explore additional quality dimensions that are equally important to academic stakeholders such as students, faculty, parents, administrators, and professionals. We utilize qualitative methods to explore such dimensions and carry out an extensive survey to calculate the salience of explored dimensions. Finally, we conduct descriptive analysis to demonstrate and measure the differences among stakeholders' priorities.

Some of the quality dimensions explored in this study, e.g., Teaching, Research, International Outlook, and Graduate Outcomes, are apparent (substantial) dimensions that directly influence the academic quality (Nicholson, 2011). The other explored dimensions, e.g., Transparency, Academic Flexibility, Accountability, and Autonomy, are abstract, that induce quality indirectly. We call such abstract dimensions "Meta-

Quality” dimensions since such dimensions refer to the core of qualities necessary for acquiring the target quality (Tushnova 2019; Xiong & Wang, 2007). One other simple definition of meta-quality is found in the literature that is “Quality of the quality process in the organization” (Nicholson, 2011; Wilson, 2006). Since abstract dimensions explored in this study are qualities that support the enhancement of gross academic performance of an institution. Therefore, we have considered these quality dimensions as Meta-Quality attributes of academic quality.

Though academic quality has been widely discussed in the literature (O’Neill & Palmer, 2004; Oldfield & Baron, 2000; Bourner, 1998; Athiyaman, 1997), there is a dearth of work regarding abstract qualities and their importance. Our contribution in this work is twofold: first, we explore the meta-quality dimensions in addition to the core academic dimensions. Second, we explore the opinions of a wide variety of academic stakeholders regarding what they precisely wish to be evaluated for institutional rankings. It may be noted that for a bureaucratic and hierarchical academic system, meta-quality dimensions are of high significance in evaluating institutional quality.

The rest of the paper is organized as follows. The following section provides a brief literature review in this context. We then frame research questions to outline the problem and provide the details of data sources. The methodology adopted is given after that. Subsequently, we present analyses along with their results. Finally, the last section concludes the findings of this work.

## **2. Exclusive Nature of Institutional Rankings**

In the past, the discussion of educational quality was confined to closed administrative and executive communities (Welsh & Dey, 2002). The scope of quality was also limited to teaching and learning processes (Oldfield & Baron, 2000). However, from the beginning of the current century, factors such as governance, accountability, and quality assurance made academic stakeholders actively involved in the discussions of education quality (Buela-Casal et al., 2007). The scope has also broadened from service quality to organizational quality (Oldfield & Baron, 2000).

Since competitive excellence is the key to continuous improvements, thus to promote competitive excellence, institutional rankings have been designed which assist stakeholders in informed decision-making (Saisana et al., 2011; Taylor & Braddock, 2007; Marginson, 2007). Although the objectives of rankings are reformatory, the

critiques have pointed out several issues in their methodologies (Sadh & Kumar, 2019; Vardi, 2016; Boulton, 2011; Adler & Harzing, 2009; Harvey, 2008; Bowden, 2000).

Despite the shortcomings, the impacts of rankings are tremendous as some of the renowned rankings are followed worldwide for multiple purposes (Bowman & Bastedo, 2011). Academic communities generally use these rankings as an easy tool for making objective decisions while ignoring their individual aspirations (Aguillo et al., 2010). One of the core issues in rankings that we are concerned about throughout the paper is their exclusive nature (Amsler & Bolsmann, 2012). Subjectivity and ad-hocism are the main issues in ranking design that come into play due to the evaluation procedure that excludes the end user. While academic quality should be defined according to the needs of stakeholders as higher education is associated with several stakeholders having different perceptions of quality (Harvey & Green, 1993; Burrows & Harvey, 1992; Middlehurst, 1992). The literature has suggested various models of defining educational quality using stakeholder theory (O'Neill & Palmer, 2004; Bourner, 1998; Athiyaman, 1997; Cheng & Tam, 1997).

Therefore, we argue that since academic communities have divergent requirements and priorities hence, measuring institutional quality in limited dimensions, which are not capable of covering the whole set of stakeholders' aspirations, is inappropriate. Further, the evaluation of institutional quality is a thoroughly complex process as it includes a combination of inputs, services, and processes having apparent and abstract attributes; hence, quality evaluation should be inclusive (Telli, 2013).

### **3. Research Questions and Data used**

This study aims to measure the adequacy of quality dimensions covered by institutional rankings and explore the additional significant dimensions. The study also estimates the differences among stakeholders' priorities regarding these dimensions. In this context, we frame four research questions as follows:

**RQ1:** Are quality dimensions covered by rankings adequate in satisfying the aspirations of stakeholders? If not, then what are the additional dimensions?

**RQ2:** Do ranking parameters correctly measure the quality dimensions for which they are designated?

**RQ3:** Are explored dimensions of quality significant for most of the stakeholders?

**RQ4:** Are there considerable differences among priorities of the stakeholders regarding explored dimensions?

The study is conducted in three phases. In the first phase, quality parameters used in the year 2018 by three popular international rankings and two national rankings were scrutinized. Quacquarelli Symonds (QS) World University Rankings, Times Higher Education (THE) World University Rankings, and Academic Ranking of World Universities (ARWU) were chosen as international rankings. National Institutional Ranking Framework of India and The Complete University Guide of UK were chosen as national rankings.

In the second phase, we conducted focus-group and personal interviews of students, faculty, administrators, professionals (IT & others), and parents. We have selected candidates belonging to public and private institutions of India's National Capital Region (NCR). The NCR is considered the mini-India as it includes a representative population from all regions/states of the country. The NCR also has representative institutions in almost every domain of study administered by India's federal government, facilitating people from the whole country. For example, the country's premier institutions, e.g., Indian Institute of Technology (IIT) Delhi, All India Institute of Medical Sciences (AIIMS) Delhi, Central universities like Jawaharlal Nehru University (JNU), Delhi University (DU), Jamia Millia Islamia (JMI), etc.), and several other premier Institutions are located in NCR. Therefore, the population in these institutions represents the whole India. Due to this reason, we have chosen the NCR for collecting most of the data used in this study.

Based on the inputs of the second phase, we designed a questionnaire and conducted an online survey. Survey invited responses from sciences, medical, technology, social sciences, and humanities domains. Students, parents, and professionals were contacted via emails and social media. Each of these categories was assumed to have an infinitely large population. The faculty of twelve institutions were contacted through emails. These institutions were Indian Institute of Technology (IIT) Delhi, IIT Madras, IIT Roorkee, Jawaharlal Nehru University Delhi, University of Delhi, Delhi Technological University, Indraprastha Institute of Information Technology Delhi, Guru Gobind Singh Indraprastha University Delhi, Jamia Millia Islamia Delhi, Jamia Hamdard Delhi, Jaypee Institute of Information Technology Noida and Tata Institute of Social Sciences Mumbai. The faculty population in these institutions was 5727 (Ref.: NIRF Rankings 2018). Since no official data was available

regarding the population of administrators (Vice-chancellor, Director, Deputy Director, Dean, and Head of the department), we excluded them from the third phase. However, their responses were analyzed separately to take the approximate idea of their choices.

## 4. Methodology

### 4.1 Identification of quality dimensions covered by institutional rankings

In this phase, we scrutinized the quality parameters of chosen rankings. Scrutiny of parameters was done for two purposes. First, it highlights subjectivity and ad-hocism prevailed in the rankings. Second, it was essential to compare the rankings for their methodological sufficiency and appropriateness. Almost all considered international rankings are published annually in various categories, e.g., global, discipline-wise, area-wise (country and continents). National rankings are also published annually in similar categories. Each ranking has almost the same evaluation structure besides having minor differences in parameters and their weightage throughout its categories. Since the sole objective of our study is to check the adequacy of quality dimensions covered by rankings, we scrutinized parameters only while neglecting other aspects such as weighting schemes. Our scrutiny of parameters resulted, six dimensions of quality.

### 4.2 Verification of dimensional adequacy and parameter space

We selected sixty persons randomly from selected stakeholder categories for focus group and personal interviews. The details of the participants are given in Table 1. We used these qualitative methods as these are the most suitable for such explorative studies (Hill et al., 2003). The methodology and questions asked for focus groups, and personal interviews were the same. We conducted focus groups studies, one each for professionals and faculty, having ten persons in each. The student category was divided into three sub-categories. Thirty students, ten from each sub-category: Undergraduate, Graduate Study, and Graduate Research, were considered for three group studies. We personally interviewed five administrators (retired and working) and five parents.

**Table 1** Number of participants in focus group and personal interviews

Category	Sub-Category	Type of study	Num. of participants
Student	Undergraduate	Focus group	10
	Graduate Study	Focus group	10

	Graduate Research	Focus group	10
Faculty		Focus group	10
Administrator		Personal Interviews	5
Professional		Focus group	10
Parents		Personal Interviews	5
<b>Total Participants</b>			<b>60</b>

We asked the respondents to choose enlisted dimensions according to their preferences. They could leave entries unselected, which they thought insignificant. Then we asked them to suggest additional dimensions that they feel are equally important. Thus, five additional dimensions have emerged from this process. Finally, we asked respondents about the appropriateness (extent of capacity to reflect quality) of ranking parameters. Subsequently, we coded their responses according to characteristics and counted their frequencies.

### 4.3 Demonstration of relative salience and priority difference

Based on the findings of the previous phase, we designed a questionnaire to conduct an online survey. We chose random sampling with a 95% confidence level and 5% error margin to analyze the responses. These settings require a minimum sample size of 385 for an infinite-sized population (as in the cases of student sub-categories, parents, and professionals). The faculty category required 361 samples according to their populations in selected institutions. The minimum sample size is calculated using the following formula, where  $N$  = population size,  $e$  = error margin and  $z$  = Z-score:

$$\text{Sample Size} = \frac{n}{1 + \frac{n}{N}} \quad \text{with} \quad n = \frac{z^2 \times p(1-p)}{e^2}$$

The percentage of respondents from each category is given in Fig. 1, which depicts a balanced proportion of each category except the administrator. After filtering out invalid responses, a total of 2558 responses were finally analyzed. Of 1348 students, 438 were undergraduates, 463 were from graduate study, and 447 were from graduate research. The sample contains 395 parents and 389 professionals. In 426 of the remaining respondents, 364 had chosen a single category of either faculty or administrator, and 62 had chosen both. We considered responses belonging to both

categories twice, once for each category. Accordingly, 401 faculty and 87 administrators were considered.

We used a four-level Likert scale associated with eleven items (enlisted quality dimensions) in the questionnaire. The marking of "1" denotes no significance, "2" low significance, "3" high significance, and "4" extremely high significance. Average attained marks were used to measure the relative salience of quality dimensions. Finally, N-Distribution Bhattacharya Coefficient (Kang & Wildes, 2015) is used to measure the dissimilarities among the priorities of selected stakeholder categories

## **5. Analyses and Results**

### **5.1 Identification of quality dimensions covered by rankings**

We categorized the parameters of selected rankings based on their domain of applicability (quality dimensions); however, some of the selected rankings explicitly define the quality dimensions. Results of parameter scrutiny are given in Table 2 and Table 3. Most of the selected rankings concentrate mainly on teaching and research, especially the global ones. ARWU is strictly restricted to teaching and research. THE-Ranking covers three dimensions teaching, research, and international outlook. QS-Ranking adds graduate outcomes apart from the three covered by THE-Ranking. NIRF and TCUG add two other quality aspects: student support services and inclusivity. Overall, six dimensions are mainly targeted by the selected rankings: Teaching, Research, International Outlook, Student Support Services, Graduate outcomes, and Inclusivity. Core dimensions such as teaching and research are common in all rankings; however, qualifying criteria for an institution to be included in the rankings and weightage given to each parameter differ significantly from ranking to ranking.

The parameters used by international and national rankings are presented in Tables 2 and 3, respectively. There are apparent differences in parameter space of national and international rankings, as evident by Tables 2 and 3. In contrast to the global rankings, the parameter space of national rankings is different and broader. National rankings utilize various parameters and their combinations to measure academic quality, whereas the parameter space of international rankings is comparatively smaller and simpler. For measuring the quality of teaching and research, ARWU establishes the highest possible criteria, i.e., (i) number of researchers having publications in top-rated journals (Nature and Science), and (ii) Noble prize won by



alumni or staff. QS Ranking is dependent mainly on the reputational standings of institutions as perceived by academic experts and employers with a few other factors, e.g., faculty to student ratio and Citation count. Besides reputational standing, THE Ranking utilizes other proxies such as faculty to student ratio, number of Ph.D. awarded, the ratio of graduate-research students to graduate-study students, income from industries, and research. Both QS and THE rankings measure global outlook by the proportion of international students and staff.

**Table 2** Scrutiny results: Parameters of International rankings

Sr.	Quality Dimensions	International Rankings		
		QS	THE	ARWU
1.	<b>Teaching</b>	<ul style="list-style-type: none"> <li>- Academic Reputation Survey (Peers, Expert),</li> <li>- Faculty Student Ratio</li> </ul>	<ul style="list-style-type: none"> <li>- Reputation Survey</li> <li>- PhD awarded to staff</li> <li>- Institutional Income</li> <li>- Faculty Student Ratio</li> <li>- PhD to bachelor ratio</li> </ul>	<ul style="list-style-type: none"> <li>- Alumni winning noble prize,</li> <li>- Staff winning noble prize,</li> <li>- Highly cited academic staff.</li> </ul>
2.	<b>Research</b>	<ul style="list-style-type: none"> <li>- Academic Reputation Survey</li> <li>- Citation per Faculty</li> </ul>	<ul style="list-style-type: none"> <li>- Reputation survey</li> <li>- Average Citations</li> <li>- Research Productivity</li> <li>- Knowledge Transfer</li> <li>- Research Income</li> </ul>	<ul style="list-style-type: none"> <li>- Papers published in Nature and Science,</li> <li>- Papers indexed in SCIE &amp; SSCI.</li> </ul>
3.	<b>International Outlook</b>	<ul style="list-style-type: none"> <li>- International Faculty Ratio,</li> <li>- International Student Ratio.</li> </ul>	<ul style="list-style-type: none"> <li>- Proportion of international students and international staff</li> <li>- International collaboration</li> </ul>	
4.	<b>Graduate Outcomes</b>	<ul style="list-style-type: none"> <li>- Employer Reputation Survey</li> </ul>		

**Table 3** Scrutiny results: Parameters of National rankings

Sr.	Quality Dimensions	National Rankings	
		NIRF	TCUG

<b>1. Teaching</b>	<ul style="list-style-type: none"> <li>– Student Strength including PhD</li> <li>– Faculty Experience and PhD</li> <li>– Total Budget and Utilization</li> <li>– Faculty Student Ratio</li> <li>– Peer Perception</li> <li>– Public perception</li> </ul>	<ul style="list-style-type: none"> <li>– Average Exam Scores of all students (Excluding Final year)</li> <li>– Expenditure on academic services</li> <li>– Average student satisfaction score</li> <li>– Faculty Staff Ratio</li> </ul>
<b>2. Research</b>	<ul style="list-style-type: none"> <li>– Num. of Publications,</li> <li>– Citation Count,</li> <li>– IPR &amp; Patents,</li> <li>– Footprint of Research, Consultancy and Executive Development Programs.</li> </ul>	<ul style="list-style-type: none"> <li>– Staff involved in research (Intensity),</li> <li>– Internal Quality profile measurement of research</li> </ul>
<b>3. International Outlook</b>	<ul style="list-style-type: none"> <li>– Percentage Student from other countries</li> </ul>	
<b>4. Graduate Outcomes</b>	<ul style="list-style-type: none"> <li>– Metrics for University Exam</li> <li>– Number of super specialty students graduated</li> <li>– Metrics for Placement, Higher Studies, and Entrepreneurship</li> <li>– Number of PhD and PG students graduated</li> <li>– Median Salary of graduates</li> <li>– Students admitted to top universities</li> </ul>	<ul style="list-style-type: none"> <li>– Population of students employed or admitted for higher studies</li> <li>– Completion rate of first-degree undergraduates</li> <li>– Percentage of first-degree graduates achieving a first or upper second-class honors degree</li> </ul>
<b>5. Student Support Services</b>		<ul style="list-style-type: none"> <li>– University's expenditure on student facilities (sports, careers services, health, counselling etc.)</li> </ul>
<b>6. Inclusivity</b>	<ul style="list-style-type: none"> <li>– Percentage Student from other states</li> <li>– Percentage of women</li> <li>– Percentage of socially challenged students</li> <li>– Facilities for Physically challenged</li> </ul>	

## 5.2 Verification of dimensional adequacy and parameter space

To answer our first and second research question, which is to check the adequacy of quality dimensions and appropriateness of ranking parameters, we have conducted the

focus group and personal interviews of chosen categories of stakeholders. Results of parameter scrutiny, containing the six quality dimensions and their corresponding parameters, are given to participants. We briefly introduced the parameters and methodology of selected rankings with the participants. We then asked the participants three simple questions: (i) Do they think all enlisted dimensions are crucial in defining institutional quality? (ii) Do they think ranking parameters are appropriate? (iii) Do they think enlisted dimensions adequately measure institutional quality? If not, then what are other dimensions that they want to suggest?

Almost all the participants (from focus group and personal interviews) agreed that quality of Teaching, Research, Graduate Outcomes, Student Support Service, and International Outlook are crucial factors that cannot be overlooked. Although none opposed Inclusivity as being important, a significant proportion of professionals (40%) and graduate study students (30%) argued that Inclusivity is more of social concern than an academic one. Conclusively, all scrutinized quality dimensions were significant.

The majority of the participants, from administrators (60%), professionals (60%), and parents (80%), responded that parameters of national rankings are more suitable to measure designated quality. They argued that one of the main objectives of rankings is to provide required information to the stakeholders. They acknowledged that the parameter space of national rankings is larger; hence national rankings are more informative. The majority of faculty (70%), undergraduates (60%), graduate study (80%), and graduate research (90%) argued that quality is a complex measure, especially in the case of teaching, research, and graduate outcomes. Hence, indirect proxies such as faculty to student ratio, number of publications, number of students graduated, and reputational standings do not adequately reflect true quality. Though they did not categorically oppose the utilization of such proxies, they suggested that these are basic statistics rather than quality measures. Overall, the majority ~64% (of all categories) asserted that parameters used by rankings provide some institutional information but are not appropriate for quality evaluation.

Regarding our third query, all participants barring some administrators (40%), agreed that mere six enlisted quality dimensions with their limited scope are not adequate to define overall institutional quality. They conveyed several distinguished factors that were out of the ambit of enlisted dimensions. A large number of participants (~76%) from faculty, professionals, parents, and all the student sub-categories asserted that besides some directly perceivable issues such as financial aspects, location, and

academic atmosphere, other abstruse natured factors also exist. We, therefore, collected and classified their responses into two categories: Substantial Quality Dimensions and Meta-Quality Dimensions. Since the issues conveyed by participants were significantly divergent, we further divided and labeled the factors based on their characteristics.

### **5.2.1 Substantial quality dimensions.**

***Fee structure & financial support.*** Most of the parents (80%), graduate study (60%), and graduate research (90%) were highly concerned with the fee. Common concerns as emerged from conversations were: (i) lower-middle-class background, (ii) Costlier higher education, (iii) lack of job opportunities, and (iv) location of institutions. Though India is one of the fastest-growing economies, India's huge population is of the lower middle class and belongs to rural backgrounds. Secondly, in India, being one of the highly populated countries, job opportunities are very competitive. Part-time work culture is not prevalent since such jobs are few and depend on the location. All participants from graduate research (100%) asserted that fellowships/assistantships are their topmost priorities which are very competitive and few in numbers. In such circumstances, additional finances such as project-based fellowships, third-party funding, and collaborative research funding are highly sought.

***Infrastructure & resources.*** Infrastructure is undoubtedly an integral part of education. Participants suggest that barring some of the renowned Indian institutions, the infrastructure of most public and private institutions stands below par and does not have some of the basic amenities. Adding infrastructure as a ranking factor will provide necessary information to the stakeholders. Hostel facility is an important concern for all the parents (100%) and most entry-level students (80%), as a few Indian universities could provide affordable residential campuses to all. Other basic amenities such as well-equipped laboratories, computational facilities, quality classrooms and libraries, and in-house training centers are also the cause of concern for most parents and students.

### **5.2.2 Meta-Quality Dimensions.**

***Academic autonomy.*** Almost all administrators (100%) and faculty (80%) suggested that academic regulations should be made by exercising full academic autonomy for better performance. The academic and administrative structure should be autonomous to accommodate changes according to the situations, including the corner cases. For example, grasping pace to acquire the required level of competency vary from student

to student. In such cases, fast learners should be exempted from procedural overheads, i.e., prescribed longer study duration, which is required for slow learners. Faculty members suggested that managerial matters related to the evaluation standards, course contents, course pre-requisites, and course duration should be decided by academic committee(s) constituted of them. Administrators asserted that in the present scenario, most of the administrative decisions are bound to follow the regulations laid by the national or state level statutory bodies, which are usually inflexible in making adjustments according to the cases under consideration. Other concerned matters are the rigid procedures and fixed admission criteria, which need to be adjusted according to the factors such as locality of the institution, the number of candidates applied, and the overall profile of the candidates, etc.

**Transparency & accountability.** Most respondents (~92%) asserted that administrative processing and grievance addressing of public institutions barring a few exceptions, is inadequate. The existing system lacks fundamental transparency & accountability that causes high processing delays and massive losses, reflecting the indifferent attitude of the administrators. Timely processing of applications, appropriate action on feedback, issue of certificates, academic counseling, evaluation of reports, disbursement of fellowships, etc., are the main concerns of students. Students are also required to know the predefined breakup of evaluation, examine the evaluated scripts, regulations concerning their academic matters, etc., in time. Faculty members and administrators asserted that recruitment, performance appraisal, and promotion procedures should be sufficiently transparent. They should also be provided with feedback and appraisal status within the stipulated time. Parents required that performance reports of their wards should be made available to them. They should be informed regularly about the feedback of their wards, remedial concern, and faculty advice. Professionals were also in favor of redefining administrative processes by incorporating the required level of transparency & accountability.

**Flexibility in academics.** Most administrators (80%) believe that the Indian academic scenario is highly imbalanced because very few institutions enjoy academic freedom. In contrast, most institutions are run by a highly bureaucratic and hierarchical system. The majority from faculty (60%), graduate study (70%), and graduate research (60%) expressed that inflexibility arises due to non-uniform regulations. Different agencies have defined their own regulations for institutions that come under their umbrella. It creates unnecessary confusion and conflict. Multiple agencies have overlapping

regulations in the country, namely University Grants Commission (UGC), All India Council for Technical Education (AICTE). Then there are accrediting agencies, namely NAAC (National Assessment and Accreditation Council) and NBA (National Board of Accreditation). Some of the regulations are contradictory and have in-built conflicts. A student or faculty may face different eligibility criteria while migrating from institutions of other affiliations. In some cases, candidates are restricted from taking admission in courses and examinations due to inflexibility. Availability of fellowships and assistantships also varies according to institutions' affiliations and other constraints such as age bar.

In this phase, we have discovered that all six enlisted quality dimensions covered by rankings are significant; however, they are not sufficient to define overall institutional quality. Furthermore, parameters used by rankings are not capable of measuring designated quality dimensions. Thus, five additional dimensions of quality and meta-quality were explored that are important to selected categories of stakeholders

### **5.3 Demonstration of relative salience and priority differences**

In this phase, we conducted an extensive survey. A questionnaire containing eleven enlisted dimensions with their definitions and scope was sent to the respondents. Respondents had to evaluate each dimension according to their priority. Although we had excluded the administrator category from this phase due to the absence of an official figure regarding their population, we analyzed their responses to understand their choices roughly. We divided this phase into three parts: one, for exploring the overall relative salience of explored dimensions; second, for demonstrating the differences among stakeholders' priorities; and third, for measuring the dissimilarities between their priorities.

#### **5.3.1 Relative salience of explored dimensions.**

We represent frequencies of marks attained by each eleven explored dimensions through the histograms in Fig.2. Most of the histograms approximate to normal distribution. Since high marks denote high significance, histograms that are biased towards the right represent dimensions of high importance as in cases of Teaching, Graduate Outcomes, and Academic Flexibility. None of the histograms is biased towards the left, which indicates none of the dimensions is insignificant.

To find the relative salience of dimensions, we arrange dimensions in descending order concerning their overall average marks. By doing so, we find their relative place in the overall significance list (the first entry denotes the most important dimension). The result of overall significance-ordering is given in Table 4. We have utilized the mean value of response marking because it is considered appropriate in this kind of study (Chen et al., 2006; Iacovidou et al., 2009). We have adopted standard competition ranking for ordering the dimensions, in which items that compare equally receive the same ranking, and a gap is left to adjust for the total number of those items, e.g., ranking is done as 1,2,2,4 (Cichosz, 2014). Table 4 suggests that average marks attained by each dimension are equal to or greater than 2.5 out of a maximum of 4, which denotes that none of the quality dimensions is insignificant. It can also be seen from Table 4 that Teaching (Mean = 3.2, Rank = 1), Graduate Outcomes (Mean = 3.0, Rank = 2), Academic Flexibility (Mean = 3.0, Rank = 2), Transparency & Accountability (Mean = 3.0, Rank = 2), Infrastructure & Resources (Mean = 3.0, Rank = 2) and Research (Mean = 3.0, Rank = 2) are top factors in defining overall institutional quality. It confirms our primary hypothesis that besides core academic dimensions covered by rankings (i.e., teaching, research, and graduate outcomes), several substantial and meta-quality dimensions (i.e., academic flexibility, transparency and accountability, infrastructure and resources) exist that are equally important in defining academic quality.

**Table 4** Mean value of marks attained by different quality dimensions in survey

Quality Dimensions	Mean	Rank
Teaching	3.2	1
Graduate Outcomes	3.0	2
Academic Flexibility	3.0	2
Transparency & Accountability	3.0	2
Infrastructure & Resources	3.0	2
Research	3.0	2
Student Support Services	2.9	7
International Outlook	2.8	8
Fee Structure & Financial Assistance	2.7	9
Academic Autonomy	2.5	10
Inclusivity	2.5	10

### 5.3.2 Demonstration of differences among stakeholders' priorities.

Next, we represent the mean value and the standard deviation (SD) of each stakeholder category separately through standard error plots in Fig 3. Mean value (solid point) stands near the most frequent trends, and standard deviation (error bars) depicts the deviation from the mean. Fig. 3 shows that the priority pattern of each category is distinct. For showing differences among priorities of stakeholders, we make six significance-orderings, one each for a category. Table 5 shows results of significance-ordering for each category. In Table 5, columns denote stakeholder categories, and rows represent average marks attained by each dimension along with the relative place (rank) in parenthesis. (Seventh dashed column is added in Table 5 for showing results of excluded administrator category).

Table 5 indicates that for undergraduates, teaching (Mean = 3.4, Rank = 1) is of the highest importance, followed by Graduate Outcomes (Mean = 3.3, Rank = 2), Infrastructure & Resources (Mean = 3.2, Rank = 3), Student Support Services (Mean = 3.2, Rank = 3), and, Fee & Financial Assistance (Mean = 3.1, Rank = 5). Whereas undergraduates are least bothered about Academic Autonomy (Mean = 2.0, Rank = 10), and Research (Mean = 2.0, Rank = 10). Entry-level students are much concerned about learning; hence, teaching is their top priority. Undergraduates also judge institutions over opportunities of getting employment and resources. They don't prioritize research and other academic processes in their early years.

Graduate study gave high weightage to Academic Flexibility (Mean = 3.3, Rank = 1) and Teaching (Mean = 3.3, Rank = 1). For the rest (Fig. 3), their priority pattern is not much different than that of undergraduates except some observable differences in International Outlook (Mean = 2.8, Rank = 7), Research (Mean = 2.7, Rank = 8), and Fee & Financial Assistance (Mean = 2.7, Rank = 8). Since graduate study students have diverse opinions about their prospects, they aspire to flexible academic regulations. It is the reason for academic flexibility being their top priority.

Priorities of graduate research are quite different than that of other students. According to Table 5 and Fig 3, for researchers Research (Mean = 3.4, Rank = 1), Fee & Financial Assistance (Mean = 3.2, Rank = 2), and Transparency & Accountability (Mean = 3.2, Rank = 2) are highly significant. Contrary to other student categories, Graduate Outcome (Mean = 2.3, Rank = 11) is the least priority for researchers. They prefer institutions with various research options and prolific faculty as their first choice.



Financial support is also an important factor for them. Being mature, confident, and having enough expertise, they feel more secure about their future occupation.

**Table 5** Statistics of survey responses of different stakeholders

Quality Dimensions	Undergraduate	Graduate Study	Graduate Research	Faculty	Professional	Parent	Administrator
Teaching	3.4 (1)	3.3 (1)	3.0 (6)	3.5 (1)	3.1 (3)	3.2 (3)	2.9 (6)
Graduate Outcomes	3.3 (2)	3.0 (4)	2.3 (11)	2.9 (7)	3.3 (1)	3.4 (1)	3.0 (3)
Academic Flexibility	3.0 (6)	3.3 (1)	3.1 (4)	3.0 (5)	3.0 (4)	2.6 (10)	2.2 (10)
Transparency & Accountability	2.8 (7)	2.9 (6)	3.2 (2)	3.1 (4)	2.9 (5)	3.0 (6)	3.1 (2)
Infrastructure & Resources	3.2 (3)	3.0 (4)	2.9 (7)	2.7 (8)	2.8 (6)	3.1 (4)	3.0 (3)
Research	2.0 (10)	2.7 (8)	3.4 (1)	3.4 (2)	3.2 (2)	3.0 (6)	3.0 (3)
Student Support Services	3.2 (3)	3.1 (3)	2.9 (7)	2.4 (9)	2.7 (8)	3.1 (4)	2.5 (7)
International Outlook	2.4 (9)	2.8 (7)	3.1 (4)	3.0 (5)	2.8 (6)	3.0 (6)	2.4 (9)
Fee Structure & Financial Assistance	3.1 (5)	2.7 (8)	3.2 (2)	2.0 (11)	2.0 (11)	3.3 (2)	1.8 (11)
Academic Autonomy	2.0 (10)	2.3 (10)	2.7 (10)	3.2 (3)	2.1 (9)	2.6 (10)	3.4 (1)
Inclusivity	2.5 (8)	2.3 (10)	2.8 (9)	2.4 (9)	2.1 (9)	2.7 (9)	2.5 (7)

Drastic variations can be seen in the faculty's priorities (Fig 3). Academic Autonomy (Mean = 3.2, Rank = 3), nearly the last choice for other stakeholders, is highly significant for faculty. Since teaching and research experience is directly related to professional growth, and autonomy gives faculty the freedom to make decisive moves, they choose teaching, research, and autonomy as their top priorities. Factors, e.g., Fee & Financial Assistance (Mean = 2.0, Rank = 11), which was at a significant priority place for students, do not concern the faculty.

Similarly, we can observe from Fig. 3 and Table 5 that preference patterns of almost all other stakeholders such as parents, professionals, administrators are divergent. It can be easily inferred that the specificity in aspirations guides the priority pattern of each stakeholder. For example, parents are concerned mainly about graduate outcomes and fee & financial assistance. Professionals are concerned with research and graduate outcome as they judge the quality of institutions in line with the needs of industries and employers, which require skilled and innovative professionals to make up current demands. Academic autonomy is the top priority of administrators as it provides the required space and flexibility for decision-making and managerial task.

**5.3.3 Measurement of dissimilarity between stakeholders' priorities.**

To measure the dissimilarities between stakeholders' priorities, we use N-Distribution Bhattacharya Coefficient (NDBC) on frequencies (histograms) of marks attained by each dimension. Bhattacharya Coefficient is a statistical measure of overlap between two normalized sample classes having the same number of partitions (Bhattacharyya, 1943). NDBC is described as follows:

$$BC(f_1 \dots f_n) = \sum_k \sqrt{\prod_{i=1}^n f_i(x_k)}$$

Where  $\sum_k f_i(x_k) = 1$  and  $0 \leq f_i(x_k) \leq 1 \forall i \in \mathbb{Z}^+$

The value of the coefficient lies between 0 (total dissimilarity) and 1 (complete overlap). NDBC extends Bhattacharya Coefficient in N-dimension for measuring overlap between more than two sample classes (Kang and Wildes, 2015). Since we have six classes (stakeholder categories excluding administrator), we use NDBC to find the measure of dissimilarity between them. As we used four scale-marking in our survey, hence histogram of each dimension has four bins (Fig. 2). After normalizing the

histograms of six stakeholders for a quality dimension, we calculate the NDBC of that dimension. This procedure is repeated eleven times separately for each dimension. One important thing to note is that as the survey used fewer scales (four) for the convenience of the respondents, NDBC shows high overlap. The value of the NDBC tends towards one as the number of histogram bins decreases.

It can be observed in table 6 that the value of NDBC for all of the dimensions is less than one; this indicates the presence of differences in the stakeholder's preferences. We can observe that factors Transparency & Accountability (NDBC = 0.96), Teaching (NDBC = 0.95), Infrastructure (NDBC = 0.96), and International Outlook (NDBC = 0.95) show less dissimilarities in the choices of stakeholders. These dimensions show nearly equal importance to each stakeholder (less variation in mean marking). It can also be verified from the error plots of these four dimensions in Fig. 4. Teaching and infrastructure are fundamental aspects of institutions, and each stakeholder agrees upon this fact, while transparency, accountability, and international outlook are the factors that academic stakeholders strongly desire

**Table 6** Values of *N*-Distribution Bhattacharya Coefficient (excluding administrators)

Quality Dimensions	NDBC
Teaching	0.95
Graduate Outcomes	0.85
Academic Flexibility	0.69
Transparency & Accountability	0.96
Infrastructure & Resources	0.96
Research	0.71
Student Support Services	0.90
International Outlook	0.95
Fee Structure & Financial Assistance	0.77
Academic Autonomy	0.85
Inclusivity	0.85

Inclusivity (NDBC = 0.85), Autonomy (NDBC = 0.85), Graduate Outcome (NDBC = 0.85), and Student Support Services (NDBC = 0.90) show moderate difference in stakeholders' priority. Fig. 5 shows mean significance patterns for these dimensions of moderate variability. High dissimilarities can be seen in case of Academic Flexibility (NDBC = 0.69), Research (NDBC = 0.71) and Fee & Financial

Assistance (NDBC = 0.77). The high difference in mean significance of these dimensions suggests that these factors are specific to particular stakeholder categories. For instance, one can see in Fig. 6 that the mean significance values of Research and Fee & Financial Assistance oscillate near extreme values for different stakeholders.

Results of NDBC (including administrator) are given in Table 7. Major changes in NDBC can be seen for Academic Autonomy (NDBC = 0.46), Fee & Financial Assistance (NDBC = 0.58), and International Outlook (NDBC = 0.74). The rest of the dimensions show minor changes. Sudden drop of NDBC in case of Autonomy and fee & financial assistance suggests that administrators' preferences for these dimensions are different than that of others. It can be verified from Fig. 7 that the mean of Autonomy is highest for administrators, while for fee structure & financial assistance, it is lowest.

**Table 7** Values of *N*-Distribution Bhattacharya Coefficient (including administrators)

Quality Dimensions	NDBC
Teaching	0.93
Graduate Outcomes	0.86
Academic Flexibility	0.70
Transparency & Accountability	0.96
Infrastructure & Resources	0.96
Research	0.75
Student Support Services	0.88
International Outlook	0.74
Fee Structure & Financial Assistance	0.58
Academic Autonomy	0.46
Inclusivity	0.87

Finally, the results establish that all of the explored quality dimensions are significant in defining institutional quality. Furthermore, the priorities of each stakeholder category regarding explored dimensions are different.

## 6. Conclusion

Institutional rankings evaluate quality mainly based on some well-known quality dimensions such as teaching, research, and graduate outcomes. However, these dimensions do not cover the whole field of stakeholders' aspirations. Results of our qualitative analysis, suggest that the existing dimensions covered by institutional

rankings are not sufficient. Moreover, parameters used by rankings are not sufficiently capable of measuring quality dimensions for which they are designated. We explore several additional quality dimensions, including substantial and meta-quality dimensions, in our qualitative analysis. Results of our quantitative analysis suggest that quality dimensions explored in the study are highly significant in defining institutional quality. We have also discovered that the priorities of different academic stakeholders are significantly dissimilar. Therefore, we advise that institutional rankings should consider the diverse aspirations of stakeholders while designing their methodologies. The ranking methodologies should take proper care while evaluating institutions as the priorities of stakeholders are largely different, which guide the institutions' objectives.

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